

# ISOPHOT STUDIES OF THE CHEMISTRY OF A PRE-PROTOSTELLAR CORE

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Dark cloud are important sites to probe the interstellar chemistry prevailing prior to the onset of star formation. Ideal candidates are the quiescent, cold cores with a centrally concentrated density distribution, such as L1498 (Kuiper et al 1996) and L1544 (Myers et al 1996), which are pre-stellar cores on the verge of collapse. Most studies of such cores rely on molecular spectral line emission from dense gas tracers. However, because of the chemical differentiation existing in the pre-stellar cores molecular emission alone does not bring out their true density distribution. For example, L1498 shows a chemically differentiated onion-shell structure with the older gas (rich in  $\text{NH}_3$  and  $\text{N}_2\text{H}^+$ ) at the center and recently formed carbon-chain molecules (rich in  $\text{C}_2\text{S}$ , and  $\text{CS}$ ) on the outer parts. Models and observations seem to indicate that  $\text{N}_2\text{H}^+$  may be a good density tracer (Bergin and Langer 1997, Myers et al. 1996), but most other species may be severely depleted. Therefore there is a need for high resolution submm and far-IR imaging to interpret the chemistry in the pre-stellar collapse, and hence the true physical conditions.

We have used ISOPHOT 200 and 100 micron data to derive the dust and mass distribution of the cold core of L1498. These data clearly demonstrate that the cold dust emission at 200 microns is peaked at the center of the core as defined by  $\text{NH}_3$  and  $\text{N}_2\text{H}^+$  emission maps. In this paper we discuss our model to calculate dust column densities using the ISOPHOT 200 and 100 micron data. We use the dust column density distribution to determine the depletion of several chemical species in the core. These results are compared to chemical models based on gas phase chemistry and dust depletion-desorption mechanisms. Our results demonstrate that depletion-desorption is the dominant mechanism regulating the chemical abundances at the central peak.

## References:

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